EFFECT OF BRAIN BASED LEARNING STRATEGIES ON PEDAGOGICAL CULTURE, COGNITIVE STYLE AND SELF-EFFICACY OF PUPIL TEACHERS

Synopsis
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1.1.0 INTRODUCTION:

"I never teach my pupils. I only attempt to provide the conditions in which they can learn."

- Albert Einstein

These words of Sir Albert Einstein best describe the teacher who supports learner centered methods of teaching. But such methods are not suitable for every student and for all the ages. Some learners need to be directed whereas some are self-directed; some needs external motivation to learn, whereas some are internally motivated to learn; some are made ready to learn whereas some are self-determined to learn. In short, some prefer pedagogical educational orientations whereas some prefers andragogical educational orientations. But the difficulty arises when pedagogical methods and practices are applied in part or in whole to situations that require andragogical dynamics. A misunderstanding or misapplication of these critical issues may result in situational, temporary, or unsustainable models of teaching learning that guide learners and perhaps undermine the entire process of teaching learning.

Learning is a process which goes on forever, throughout the life span of an individual. Learning begets a formal framework when it comes to learning through schools. The fabric of such formal education is woven with proper Instructional Strategies as the warp and weft. Apt Instructional Strategies, appropriately matching the needs and peculiarities of the learners in mind, enhances the reach of the education and ensures successful learning.

From ancient times man has been trying to understand human brain. The last two decades of the 20th century were the 'Decades of the Brain' with landmark discoveries related to brain research on human learning. Due to advanced technology, our understanding of how human brain learns has radically developed. Even though we are in the 21st century, our education system is still struggling to apply these brain researches to human learning in the classroom. Hence, one should understand how the human brain learns, the strategies implemented and the results of brain researches on learning principles of the brain.

Advent of novel and precise technologies and innovations in the sphere of education has made their own positive resonance in the field of Instructional Strategies also. Paramount example of such path breaking and constructive interventions is Brain Based Learning Strategies. Frontier researches in Neurosciences and medical sciences have shed insights into the anatomical point of view of human

learning leading to the evolution of a branch of science with interdisciplinary connotations. Cognitive science presents itself as an ever expanding wave front of knowledge and insights with pioneering implications in education and pedagogical sciences **(Caine & Caine,1997; Jensen, 2008)**.

1.1.1 BRAIN BASED LEARNING STRATEGIES:

Brain-based learning has been called a combination of brain science and common sense. Hart (1983) called the brain 'the organ of learning'. Brain-Based learning is a comprehensive approach to instruction based on current research in Neuroscience which suggests how our brain learns naturally. This type of education provides a biologically driven framework for teaching and learning, and helps explain recurring learning behaviours. It is a meta-concept that includes an eclectic mix of techniques. Currently, these techniques allow teachers to connect learning to students' real life experiences. This form of learning also encompasses such educational concepts such as mastery learning, learning styles, multiple intelligences, cooperative learning, practical simulations, experiential learning, problem-based learning, movement education, etc.

1.1.1.1 History of Brain Based Learning Strategies:

Until 19th century there has been a primitive model of how the brain works. It was in 1970's that the concept of 'Brain' gets highlighted. Many books giving importance to concept of brain were published **(Buzan, 1974; Edwards, 1979)**. **Leslie Hart (1983)** argued through his book Human Brain and Human Learning that cognitive processes were significantly impaired by classroom threat and he said brain as the organ of learning. It was in the same year **Howard Gardner (1983)** talked of multiple intelligences. These developments in this area gave a new insight among educationalist.

1.1.1.2 Elements of Brain Based Learning Strategies

The brain processes information all the time. It is always responding to the complex global context in which it is immersed. Brain-based education, therefore, involves: 1. Designing and orchestrating lifelike, enriching, and appropriate experiences for learners. 2. Ensuring that students process experience in such a way as to increase the extraction of meaning. Among the features of brain-based learning are active uncertainty or the tolerance for ambiguity; problem solving; questioning; and patterning by drawing relationships through the use of metaphor, similes, and demonstrations. Students are given many choices for activities and projects. Brain-based learning is meaningful to the

learner. What is learned makes sense. It is not necessarily brain based if parameters are strictly defined, the learning process is constricted and controlled, and students engage in specified activities for the purpose of identifying predetermined outcomes **(Caine & Caine, 1991)**. The brain continues to build its learning capacity as long as it continues to be used. When people stop using their brain the capacity for learning is diminished.

1.1.1.3 Principles of Brain Based Learning Strategies and its Classroom Implications:

These principles provide us with a framework for learning and teaching that moves us irrevocably away from the older methods dominated education for more than a century. **Caine and Caine, (1991)** developed twelve brain principles which were derived from various disciplines and it acts as a framework for Brain Based Learning Strategies. They are,

1. The brain is a parallel processor
2. Learning engages the entire physiology
3. The search for meaning is innate
4. The search for the meaning occurs through patterning
5. Emotions are critical to patterning
6. The Brain processes parts and wholes
7. Learning involves both focused attention and peripheral perception
8. Learning always involves conscious and unconscious processes
9. Balanced composition of different types of memory: A Spatial Memory system and a set of systems for Rote Learning
10. Understanding improved when facts and skills are embedded in natural, spatial memory
11. Learning is enhanced by challenge and inhibited by threat
12. Each brain is unique and having individuality among learners

Brain Based Learning Strategies does not follow a fixed template. Since every brain is unique, a fixed structure would not fix every learner. **Caine and caine (2000)** identified three main conditions for learning to occur. They are relaxed alertness, Orchestrated immersion and Active processing.

There has also many critics to this Brain based Learning. Their main query is that which learning is not brain based? This area is yet to be mainstreamed and the following years will surely serve the answers

to these queries. Knowing the brain and planning the activities that brain likes- this is the main aim of Brain Based Education. Its only two decades that the neuroscience has started its studies more on brain developments and reveal the mystery of the brain. **Craig (2003)** says, it does not prescribe how to run your classroom or offer specific techniques to use. Rather, it provides empirical data about how the brain learns and suggests guidelines to be considered while preparing lessons for your students. These guidelines may be incorporated into every educational setting, with every type of curriculum and every age group. Brain- based learning is neither a panacea nor a magic bullet that will solve education's problems.

The roots of brain-based learning principles are in neurological research, particularly during the 1990s. Based on their research and experience, **Caine et al. (2005)** argued that great teaching involves three fundamental elements, are as follows:

a) Relaxed Alertness: Creating the optimal emotional climate for learning.

b) Orchestrated Immersion in complex experiences: Creating optimal opportunities for learning by allowing students to physically interact with what is to be learned or understood. Performing in variety of ways like expressing thoughts through pictures, drawings, poetry, story, receiving feedback from others can be included in the same category.

1.1.2 Active Processing of experience: Creating optimal ways to consolidate learning. It can be done by detailed sensory observation; deliberate practice and rehearsal; making links to previous learning; multiple modes of questioning; incorporation of expert knowledge; analysis of data and source and writing reflections. With all these educational implications which are rather the elements of Brain-based learning there comes out various strategies of teaching which can be implied in the classroom in order to fulfill these basic elements of this neurological approach.

1.1.3 PEDAGOGICAL CULTURE:

The word ‘pedagogical culture’ formed with combination of ‘Pedagogy” and ‘culture’. Here, Pedagogy most commonly understood as the approach to teaching, is the theory and practice of learning, and how this process influences, and is influenced by, the social, political and psychological development of learners. Pedagogy, taken as an academic discipline, is the study of how knowledge and skills are imparted in an educational context, and it considers the interactions that take place

during learning. Both the theory and practice of pedagogy vary greatly, as they reflect different social, political, and cultural contexts.

Pedagogy is often described as the act of teaching. The pedagogy adopted by teachers shapes their actions, judgments, and teaching strategies by taking into consideration theories of learning, understandings of students and their needs, and the backgrounds and interests of individual students.

The concept of culture is the tension between the internal and the external that is, culture always already has two aspects. One of these aspects may be called psychological and it inhabits the mind of the carrier of culture: it is the way of thinking, those beliefs, convictions and intentions which the individuals of a given culture have in common. Henceforth it shall refer to this side of culture by the simplified term beliefs, including both suppositions that can be rationally substantiated and superstitions that are indefensible from a rational point of view.

The second aspect of culture is found in behaviour, in acts (and objects). Hence forward, it shall borrow **Lucien Febvre's (1942)** term and call these external factors mental toolbox. Basically it refers to the totality of the perceptional, conceptual, linguistic and expressive categories, as well as the category of action, of an era or civilization which determine individual and collective experience. This hypothesis, however, is not axiomatical, since culture is the collective possession of a group and its centre lies outside the individual's mind.

According to **Isaev (2002)** pedagogical culture is an integrated characteristic of teacher's personality, which includes a certain level of mastery of professional-pedagogical values, person-oriented technologies and methods of creative self-realization in professional activity. Scientist distinguishes the following components of pedagogical culture: individual pedagogical orientation, psychological and pedagogical erudition and intelligence, moral purity, harmony of rational and emotional, pedagogical skills, ability to combine pedagogical and scientific activity, system of professional and pedagogical qualities, pedagogical communication and behavior, demand for self-improvement.

According to **Slastonin, Isaev & Shiyanov (2009)** pedagogical culture as integration, synthesis of natural and acquired personal properties that provide a high level of teacher's activity, and distinguishes three components in it: axiological, technological and personal, creative. Axiological

component is formed by a set of pedagogical values created by humanity and peculiarly included in a holistic pedagogical process at the present stage of development of education. Technological component includes methods and techniques of teacher‘s pedagogical activity. Personal and creative component reveals the mechanism of mastering professional-pedagogical culture and its embodiment as a creative act. Having mastered the values of pedagogical culture, a teacher is capable of transforming and interpreting them.

The teacher´s pedagogical culture provides the possession of the necessary set of knowledge and skills, which determine the formation of his teaching activity, teacher communication, teacher´s personality, as the bearer of certain values, ideals and the pedagogical consciousness. The pedagogical culture has its own specific features: attitude to the children, teaching activity, to himself as to the value; the transference of social-cultural experience to students through the guidance of cultural norms in educational activity; the use of innovative forms, methods, technologies of training and students´ education; a critical attitude to them and the creative transformation of educational activity.

The analysis of scientific literature has shown that pedagogical culture is seen as part of human culture; the integral quality of the teacher´s personality, which projects his common culture to the profession, the synthesis of high professionalism and the internal properties of the teacher´s personality, the possession of the teaching´s methods and the presence of the cultural-creative skills; a certain range of the value relations to education and child, which objectively and practically is implemented in the educational process; a set of intellectual, moral, aesthetic, emotional and verbal cultures, which basis is the teacher´s common culture.

1.1.3.1 PEDAGOGY IN TEACHING LEARNING:

Pedagogy in teaching learning process can be successful in three dimensions of teaching. The dimensions were as bellow

1. Teaching Repertoire:

The teaching repertoire process done by the six ways-

Modeling: Modeling is a powerful strategy that can be used across all subjects to help pupils to learn and to develop confidence in a new skill or procedure. Modeling sets out the principles of this strategy and provides guidance on how to introduce modeling into lessons and make it effective.

Questioning: It explores the different types and purposes of questioning. It explains how to organize questioning for whole class and group work, and offers strategies such as providing 'wait time' for making it effective. Bloom's taxonomy is used to provide a framework for planning questions that challenge and develop pupils' thinking.

Explaining: The purpose of explanations in teaching and learning features and skills of successful explanations encapsulated in this section. It explores different types of explanation, how to plan for them, which strategies are effective – particularly for those involving abstract ideas.

Guided learning: It describes an instructional sequence for the teacher working with small groups, which is integrated into lessons to act as a bridge between whole-class teaching and independent work. It provides a range of examples and addresses practical questions of organization including time, classroom layout, management of behavior and resources.

Group Work: It emphasizes the need for establishing clear rules and procedures and sets out a range of techniques to ensure pupil engagement and cooperation, such as allocating roles and setting group targets. Methods for structuring group work, such as 'snowballs', 'envoys' and 'rainbows', are suggested and the benefits and limitations of different grouping criteria explored.

Active Engagement Techniques: It explores what is meant by engagement and why it is important. A range of strategies to motivate and engage pupils is examined, for example directed activities related to text to promote active reading, strategies to promote active listening, thinking strategies, and the use of drama across subjects.

2. Creating Effective Learners:

Assessment for Learning: This part explores what is meant by assessment for learning and its importance. It explains how good assessment practice can contribute to better learning and higher achievement. This part focuses on the key characteristics of assessment for learning and examines a range of practical strategies for incorporating these principles into classroom routines.

Using ICT to enhance learning: The use of ICT in classroom enhances the quality of teaching and learning practices. It looks at the relationship between teachers' use of ICT as a medium for teaching and the development of pupil capability. There are guidelines on the use of classroom support assistants and technicians, on classroom management and on organisation in the ICT rich classroom.

Leading in Learning: This part provides an introduction to thinking skills by clarifying the nature of higher-order thinking and different approaches to 'teaching' thinking. It also provides practical guidance for improving the teaching of aspects of thinking skills lessons, such as improving the teaching of the plenary, helping pupils to see the relevance of thinking in everyday contexts and developing their use of 'thinking words'.

Developing Effective Learners: Through the use of case studies, this part explores what is meant by an effective learner, what learning skills might be expected of pupils at each key stage and how learning skills can be developed within subjects.

3. Creating Conditions for Learning

Improving the Climate for Learning: The physical environment can make a significant difference to learning and this part explores how even small changes to the classroom help. It looks at arranging furniture to suit the teaching approach and creating displays that really contribute to learning. Teacher–pupil relationships are another important factor in classroom climate, and the unit also describes how pupil expectation and motivation can be improved through the use of appropriate classroom language.

Learning Styles: It provides advice on how to identify different learning styles but, more importantly, emphasizes the need to provide a variety of activities to suit different styles, over time. There is guidance on how to plan and adapt activities to accommodate visual, auditory and kinesthetic learners.

Classroom Management: The emphasis in this part is on developing the concept of teaching behavior that is conducive to learning. The fundamentals of good pedagogy and practice, which are explored in the other units, are the bedrock of successful teaching and learning.

The main functions of pedagogical culture are: epistemological, humanistic, communicative, informational, normative, and educational. Features of professional and pedagogical culture are as follows:

(a) universal characteristics of pedagogical reality, which manifests itself in various forms of existence;

(b) internalized general culture that performs a function of specifically designing a common culture in the field of teaching activity;

(c) system education consisting of a number of components having their own organization that selectively interact with the environment and possess integrative property of the whole, which is not

reduced to the properties of individual parts;

(d) unit of analysis of professional and pedagogical culture – creative activity of the teacher.

The personality of the teacher is characterized by many socially significant features, one of which is its pedagogical culture. Synthesizing in itself various elements of consciousness and practical activity, the pedagogical culture contains in its basis the ideological, moral, professional, intellectual, emotional, aesthetic, physical and hygienic aspects of culture. Structurally, pedagogical culture is a synthesis of psychological and pedagogical beliefs and mastery of general development and professional pedagogical qualities, pedagogical ethics and a system of multifaceted relationships, style of activity and behavior.

1.1.4 COGNITIVE STYLE:

Cognitive-Style is a hypothetical construct that has been developed to explain the process of mediation between stimulus and response. The term Cognitive Style refers to the characteristic ways in which an individual conceptually organizes the environment. It is viewed that Cognitive Style refers to the way an individual fitters and processes stimuli so that the environment takes on psychological meaning. As such cognitive representations modify the one-to-one relationship between stimulus and response, if it were not for these cognitive representations; stimuli would have been irrelevant for the individual as the individual would respond to the stimulation in a robot like fashion. The way an individual search and acquire, interpret, categories, remember and retrieve information in making decisions and solving problems in daily life.

Cognitive Style is also understood in terms of consistent patterns of organizing and processing information. **Coop and Sigel (1971)** equated Cognitive Style with modes of behaviour rather than mediating processes. They used the term Cognitive Style to denote consistencies in individual modes of functioning in a variety of behavioural situations. Therefore, it is proper to mention here that Cognitive Style is conceived as one of the aspects of psychological differentiation. Psychological differentiation refers to differentiate mode of perceiving, judging and appraising things to which people are exposed to under different conditions.

The notion of Cognitive Style has been defined as self-evident modes of functioning which the individual shows in his perceptual and intellectual activities **(Witkin, et.al, 1962)**. It is conceptualized

as stable attitude or habitual Strategies which determines a pearsons' typical modes of perceiving, remembering and problem-solving. There are several types of cognitive functioning among which field dependence and field independence are well known. A field dependent individual is found to be passive and less competent in analytical functioning having greater social orientation. He has poor impulsive control and undifferentiated self-concept.

1.1.4.1 Dimensions of Cognitive Style:

Theories of cognitive-styles were developed as a result of early studies conducted by Witkin, et, al; (1954; 1962). These studies resulted in theories that generally assumed a single dimension of cognitive style with two extremes. The two extremes were described in general terms by **Keen (1973)**; **Mikenney & Keen (1974)** and Botkin (1974) as; Systematic Style and Intuitive Style. The systematic style is associated with logical, rational behaviour that uses a step-by-step, sequential approach to thinking, learning, problem- solving and decision making. In contrast the intuitive-style is associated with a spontaneous holistic and visual approach. These two styles however did not reflect the entire spectrum of people's behaviour with regard to thinking, learning and especially problem solving and decision-making. Therefore, a multi- dimensional model intended to reflect the entire spectrum was postulated**(Martin,1983)**. This model consisted of two continuum; i.e.; (1) High systematic to low systematic and (2) High intuitive to low intuitive. Ongoing observational studies, along with effects to develop measurement devices for assessing cognitive behaviour, have resulted in an expanded version of the original model, which led to the development of five following styles :

1. **Systematic Style:-**An individual who typically operates with a systematic style uses a well defined step- by-step approach when solving a problem; looks for an overall method or pragmatic approach; and then makes an overall plan for solving the problem.
2. **Intuitive Style:-** The individual whose style is intuitive, uses an unpredictable ordering of analytical steps when solving a problem, relies on experience patterns characterized by un verbalized areas or hunches and explores and abandons alternatives quickly.
3. **Integrated Style:-**A person with an integrated style is able to change styles quickly and easily. Such style changes seem to be unconscious and take place in a matter of seconds. The result of this "rapid fire" ability is that it appears to generate an energy and a proactive approach to problem-solving. In

fact, integrated people are often referred to as "problem-seekers" because they consistently attempt to identify potential problems as well as opportunities in order to find better ways of doing things.

4. Undifferentiated Style:-A person with such a style appears not to distinguish or differentiate between the two style extremes; i.e.; systematic and intuitive and therefore; appears not to display a style. In a problem solving situation, he will exhibit a receptivity to instructions or guidelines from outside sources. Undifferentiated individuals tend to be withdrawn, passive and reflective and often look to others for problem-solving strategies.

5. Split-Style:- An individual with split style shows fairly equal degrees of systematic and intuitive specialization. However, people with a split style do not possess an integrated behavioral response; instead, they exhibit each separate dimension in completely different settings; using only one style at a time based on nature of their tasks. In other words, they consciously respond to problem-solving by selecting the most appropriate style.

1.1.5 SELF EFFICACY:

Self Efficacy is a psychological variable which influences learning and achievement (American Society of Horticultural Science, 2011). When humans have a strong sense of perceived Self Efficacy, they put forth a greater effort to accomplish a task despite the obstacles they encounter than those who have a weak sense of Self Efficacy. Self Efficacy is very crucial in a student's success. Teachers can stimulate the level of Self Efficacy in students using different Instructional Strategies. Many of the studies shed light towards the conclusion that Instructional Strategies and Learning Styles have significant effect on the Achievement **(Duman, 2006; Oludipe, 2012, and Bhatti & Bart, 2013) and Self Efficacy (Oghyanous , 2017; Guvenac 2010, & El-Hmoudovaa, 2015)**

Self- Efficacy cannot be considered as a generalized trait. "It is a persons' belief in his/ her ability to perform a specific task" **(Bandura, 1986)**. It can be considered as a predictor of a person's behaviour and performance. It motives a person in achieving something. At a given point of time, it determines the initial decision to perform a task, the amount of effort to be expended, and the level of persistence **(Rothmann and Cooper, 2015)**. The main components of Self Efficacy are considered as performance outcomes, vicarious experiences, verbal persuasion, and physiological feedback **(Bandura 1977)**. These components help individuals determine if they believe they have the

capability to accomplish certain tasks (Redmond, 2010).

I. Personal outcomes:

Personal outcomes are the beliefs that an individual's accomplishments are greeted. Positive and negative experiences can influence the ability of an individual to perform a given task. If one has performed well at a task previously, they are more likely to feel competent and perform well at a related task **(Redmond, 2010)**.

II. Vicarious experiences:

Vicarious experiences are dealt with a model observation, that is both positive and negative experiences can influence the ability of an individual to perform a given task. If one has performed well at a task previously, they are more likely to feel competent and perform well at a related task **(Redmond, 2010)**.

III. Physiological feedback:

Physiological feedback refers to the physiological response to one's own emotional arousals. **Bandura (1986)** says that these factors and its relationship is an integral part of one's efficacy. It can be said that the relationship between the components reciprocate and reinforce one another. Students in a classroom also have the variations of the perceived self- efficacy. It motivates the learner to accomplish a task, activities, environment, home works and peer adjustment.

1.2.0 EMERGENCE AND JUSTIFICATION OF THE STUDY:

Teacher Education is an educational programme that is related to the development of teaching proficiency and teaching competence in an individual; and enables him/ her to teach from pre-primary to higher education level. It also helps in discharging responsibilities of educational profession more responsibly. In short, Teacher Education is an educational programme which develops the essential knowledge, attitudes, behaviours and skills in teachers that are required for discharging their responsibilities more effectively and efficiently in the classroom, school and community.

Pedagogy in educational vernacular has gained currency as a substitute for methods of instruction or techniques of teaching (Loughran, 2006; van Manen, 1999). Based in part on the misperception that teaching is a technical activity, this instrumental understanding of pedagogy rationalizes and reduces the work of teaching to a universally applicable skill set. As a result, the scientific pursuit of pedagogy

often excludes the intimate choices and interactions that ultimately constitute instruction. However, considering that teaching is a situated and reflexive activity requiring teachers' judgment in apprehending events of practice (Grimmett & MacKinnon, 1992), why curricular and instructional decisions are made are as much a part of pedagogy as the outwardly visible method or approach ultimately taken.

Student in B.Ed. Programme of Teacher Education Institutes (TEIs) are usually adults who have passed their graduation or post graduation and are usually above 19 years of age. At this age, they bring with them various learning needs and their instructional process must emphasis helping the students to become more self-directed learners. Their instructional and learning experiences must include learning for action, learning for problem solving, learning for empowerment and should be reflective, collaborative, participative, and critical in nature. Investigator reviewed various studies based on brain based learning at national and international level and cited as under-

Konecki and Schiller (2003) studied the brain based learning in Elementary Science. It focused on the possible relationships between and implications of research on Brain Based Learning to the teaching of science education .The implication of the study on three implication from current brain research that is Stress limits children's ability to learn, Doing activities have immediate connection to the real world increased learning and to maintain dendrite and learning, it is important to use them.

Davis (2004) in his paper discussed the current fashion for brain based learning, in which value- laden claims about learning are grounded inn neuropsychology. It argues that brain science cannot have the authority about learning that some seek to give it. The heart of the paper tries to snow how the contribution of brain science to our grasp of the nature of learning is limited in principle.

Wolfe and Brandt (2006) in this article discusses the potentially important implications of neuroscience or main research, the newest breakthrough in education, for educators and the importance of sorting out claims on brain based programs. It is obvious that brain research is not the elusive silver that will answer all education problems.

Duman (2006) compared social studies instruction based on the brain-based instruction (BBI) and traditional teacher-centered method. The study concluded by saying that, there exists a significant difference between experimental group and control group in terms of academic achievement.

Parker, Director, and, Sedona (2007) reported in their paper that the system of Brain Education for Enhanced Learning (BE) is a powerful, innovative approach to education for grades pre-K to 12. Research reported that Brain Education has impact on student performance and behaviour tend to support these benefits.

Wilmes, Lauren, and Patty (2008) through their paper addressed the need of brain based teaching strategies and making the educators aware about best quality learning environments for enhancing instruction. He also suggests that sensory and brain based teaching strategies can no longer be left behind and incorporating brain research findings into classroom instruction is the need of the hour.

Tufekci and Demirel (2009) studied the effect of learning organized instruction which designed according to the brain based learning on achievement, retention, attitude and the learning process. The study points out that brain based learning environment has a positive effect on the higher level learning, retention of the learning and the attitude toward course of the university students.

Alexander (2010) concluded that pedagogy has reified the term both in the vernacular of education and in research of teaching and teacher education, leading the scientific pursuit of pedagogy to exclude the relationship between pedagogy and pedagogue. Based on this concern, this study considers the artistic and relational dimensions of pedagogy in teacher education. Drawing on the perspective that pedagogy reflects arts of teaching, this study seeks to sketch a more holistic understanding of pedagogy in teacher education. **Samur and Duman (2011)** conducted a study to examine if there is a significant relationship between brain-based e-learning and grammar translation method in middle school students‟ academic achievements and attitudes towards an English course taught in Turkey. The findings of the study revealed that the academic achievement of the experimental group showed higher than the control group taught through grammar translation method.

Nisha (2012) explored the elements of brain-based education in the National Curricular Framework for Teacher Education (NCFTE) and concluded that the framework shows presence of brain-based elements in its various curricular and conceptual components and highlighted the brain-based foundation of the NCFTE 2010.

Panse (2012) conducted a study in Pune for deprived students on the development of brain based program for enrichment of oral communication of first standard. The program was implemented for

116 hours on 82 girl students through direct interactions between researcher and students. The study revealed positive effect on Brain Based program for enrichment of oral communication for 1st standard deprived students.

Akyurek and Afacan(2013) examined the effect of brain-based learning approach on attitudes and motivation levels in 8th grade students‟ science classes. The main reason for examining attitudes and motivation levels, the effect of the short-term motivation, attitude shows the long-term effect. Results show that, using brain-based learning approach the experimental group's success was found to be significant differences in favour of the Experimental Group.

Kaur (2013) studied the effectiveness of brain based learning strategies on enhancement of life skills among primary school students with internal and external locus of control. 2x2x2 factorial design was used in the study. The results indicated that the experimental group performed significantly better in life- skills in comparison to control group.

Binulal and Aravind (2013) suggested that Brain based learning can be considered as one of the methods to create such meaningful learning experience in the classroom. They also recommends to make the classroom learner centered, teachers must develop students‟ understanding of course content by enriching the classroom environment to include physical, emotional and social aspects.

Kapadia (2014) surveyed to determine the level of awareness measured as knowledge, beliefs, and classroom practices about brain-based learning among school teachers of Greater Mumbai. The results revealed that the teachers showed above average amount of knowledge in the area of brain-based learning. The results showed that teachers do Brain-Based Learning but need proper orientation indicating that knowledge about it would help them practice it in their classrooms

Sharma (2015) conducted a research on VII class science students who were taught with the brain-based instructional strategies. The findings revealed that the students taught with these strategies improved their achievement in science as well as self esteem. Similar study was conducted by her with the students having different types of learning styles. The findings revealed that students with accommodation and divergent learning styles scored better in science as compared to students with convergent and assimilation styles.

Keshavarzi , Sani , and Shami (2016), conducted with the aim of the effects of teaching method of

writing with brain-based learning on educational self-efficacy and written ability of female students in fifth grade of primary school. The results of the study revealed that there is statistically significant difference between written language of the control group and the experimental group as well as between academic self-efficacy of experimental and control group.

Oghyanous (2017), investigated the effect of brain-based teaching on the self-efficacy of young EFL learners. The initial participants of the study were 90 learners within the age range of 13-16 who were selected based on convenience sampling. Experimental study resulted in indicating that brainbased teaching approach had a significant effect on students‟ self-efficacy

Yasar (2017) aimed at performing content analysis and meta-analysis on dissertations related to brain-based learning in science education. The results indicated a positive and significant effect of brain-based learning approach on achievement and attitude of learners. Based on the study results, it is suggested that brain-based learning should be more widespread in the fields of chemistry, physics and biology and primary education and that qualitative and mixed research as well as quantitative research methodology should be done for obtaining reliable, valid and in-depth results in the future.

Ali and Mondal (2018) concluded that pedagogy is the discipline that deals with the theory and practice of teaching. Pedagogy informs teaching strategies, teacher actions, and teacher judgments and decisions by taking into consideration theories of learning, understandings of students and their needs, and the backgrounds and interests of individual students. The purpose of pedagogy is to empower both teachers and their students to improve the quality of learning in the classroom situation. This research paper suggests not only taking the languages, histories, experiences, and voices of the students seriously, but also integrating how to taught (process of teaching) in schools to the dynamics of everyday life.

Joefrey R. Chan (2021) concluded that Teacher's pedagogy is a key factor in achieving better learning from both the teacher and the students through the application of theory and practice in teaching a particular subject and its context. It is suggested in this study that to further improve pedagogy in teaching, teacher must have to develop skills in giving emphasis on researching in detail the material to be taught, capitalizing on the extraction of students' view and insights in searching for meaning, and leading the students to abstractions.

Many studies have showed proven benefits of Brain Based Learning Strategies **(Van & Rice, 1984; Avaci & Yagbasani, 2004; Cengelci, 2005; Waters, 2005; Duman, 2006, and Inci & Erten, 2011)** on Achievement. **Hill (2013)**, in his study shows that this Strategies is positively related to Self efficacy too. Studies on relationship between Brain Based Learning Strategies and its effect on Self efficacy have found to be few in number. Some studies with negative influence of Brain Based Learning Strategies on Achievement were also found **(Duman , 2010; Tilton , 2011 and Elwick, 2014)**.

The current research aims to find out the Brain Based Learning Strategies preferred by the students at this age. Moreover, it will also undertake on the relatively uncharted area of educational orientations under brain based teaching learning Strategies adopted by teacher educators. And by doing so it will investigate how student teachers experience the learning and teaching process as carried out by the educators in the light of their pedagogical culture, cognitive style and self efficacy .

Although, the researcher has come across the fact that Brain Based teaching learning orientations has been studied in other areas like academic performance, attitude, cognitive ability and creativity and academic subjects at different level of education, but the field of Teacher Education is devoid of such studies. Moreover, there is a dearth of such studies in India and no study is found on pre-service teacher education programme in reference to educational orientations under brain based teaching learning and its effect on pedagogical culture, cognitive style and self efficacy among pupil teachers. It is expected that the results of the study can add to the didactic literature, and will contribute to a better understanding of practices in the education sector.

It will benefit the management, student teachers and teacher educators in the colleges of education and the outcomes of this research can enhance professional practices. It will help in making educational interactions in institutions more learners centered and is expected to generate data that can help in drafting future policy decisions, curricula and programmes at pre-service education programme. The research is expected to lead the improvements in the quality of teacher preparation programmes of the country. Thus, investigator will decide to carry a research on effect of brain based learning Strategies on pedagogical culture, cognitive style and self efficacy of pupil teachers.

1.3.0 STATEMENT OF THE PROBLEM:

Effect of Brain Based Learning Strategies on Pedagogical Culture, Cognitive Style and Self-efficacy of Pupil Teachers

1.4.0 DEFINITION OF KEY WORDS USED IN THE TITLE:

Brain Based Learning Strategies

Brain-Based Learning involves accepting the rules of how the brain processes, and then organizing instruction bearing these rules in mind to achieve meaningful learning **(Caine & Caine, 1994)**. According to **Jensen (2008)**, Brain-Based Learning is related to teaching strategies and principles from an understanding of how the brain functions and learning with the brain in mind. Brain based learning involves 12 major principles on which the brain works.

Operational definition: In the context of the present study, Brain-based learning is a learning approach that is aligned with how the brain naturally learns best. It is an instructional approach in which conductive learning environment is created by the teacher with minimum threats and maximum challenges so that learning becomes an enjoyable activity.

Pedagogical Culture:

Pedagogical culture is an integrated characteristic of teacher's personality, which includes a certain level of mastery of professional-pedagogical values, person-oriented technologies and methods of creative self-realization in professional activity. **(Isaev; 2002)**

Operational definition: In the present study, pedagogical culture will be determined as the integral quality of the teachers' personality synthesizing high professionalism and internal properties of the teacher´s personality such as teaching competency, leadership quality, teaching ethics, management skills, possession of the teaching methods and the presence of the cultural-creative skills which objectively and practically is implemented in the educational process.

Cognitive Style:

The notion of Cognitive Style has been defined as self-evident modes of functioning which the individual shows in his perceptual and intellectual activities **(Witkin, et.al, 1962)**.

Operational definition: In the present investigation, Cognitive style of pupil teachers will be determined as their mode of mental decisions such as ways of thinking, judging, remembering, storing

information, decision making and believing in interpersonal relationship.

Self Efficacy:

Bandura (1997) describes self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments".

Operational definition: In the present investigation, self-efficacy of pupil teachers will be referred as the beliefs of pupil teachers in own capabilities as teacher, what extent they found competent to design new teaching strategies and its implementation in the classroom.

Pupil Teachers:

Pupil teachers are the students who were enrolled in the Pre- service teacher education programme like B.Ed. course. In the present study, investigator will select the students as pupil teachers pursuing B.Ed from Faculty of Education, Dayalbagh Educational Institute (Deemed University), Agra.

1.5.0 OBJECTIVES OF THE STUDY:

1. To develop instructional material based on principles of Brain Based Learning Strategies with reference to the curriculum of Bachelor of Education (B.Ed) programme.
2. To study the pre-experimental measures for groups homogeneity (pedagogical culture, cognitive style and self efficacy) between pupil teachers of experimental and control group.
3. To study the effect of Brain Based Learning Strategies on pedagogical culture of pupil teachers
4. To study the effect of Brain Based Learning Strategies on cognitive style of pupil teachers.
5. To study the effect of Brain Based Learning Strategies on self efficacy of pupil teachers.

1.6.0 HYPOTHESES OF THE STUDY:

1. (H_1): There will be significant difference between pre-test and post-test scores of pedagogical culture of pupil teachers under experimental group.
2. (H1): There will be significant difference between pre-test and post-test scores of pedagogical culture of pupil teachers under control group.
3. (H_1): There will be significant difference between pre-test and post-test scores of cognitive style of pupil teachers under experimental group.
4. (H1): There will be significant difference between pre-test and post-test scores of cognitive style of pupil teachers under control group.

5. (H_1): There will be significant difference between pre-test and post-test scores of self efficacy of pupil teachers under experimental group.
6. (H_1): There will be significant difference between pre-test and post-test scores of self efficacy of pupil teachers under control group.

1.7.0 METHODOLOGY

The methodology of the present study is briefly described under the following headings.

1.7.1 Research Method:

As per nature of the study, Quasi-experimental research design (Pre-test & Pos-test equivalent group design) will be used in the present study.

1.7.2 Design of the Study:

In this study, the investigator will adopt the "Pre test Post test equivalent group design". This design is used in classroom experiments when experimental and control groups are such naturally assembled groups as intact classes, which may be similar (Best and Kahn, 2006). Hence without disturbing the natural setting of the classroom, intact class groups will be selected for the study. In the present study, investigator will construct two equivalent intact classroom groups, one experimental group and one control group. A pre test will be administered to the two groups at first. Then, these groups will be randomly assigned to treatments. The experimental group will be instructed through Brain Based Learning Strategies and the control group will exposed to conventional method of teaching. Then the post test will be given to both groups. The differences between the pre test and post test scores will be compared with the help of appropriate statistical techniques to ascertain the relative effect of Brain-Based Learning Strategies and Conventional method of teaching. Investigator has drawn a sketch for cited as follow

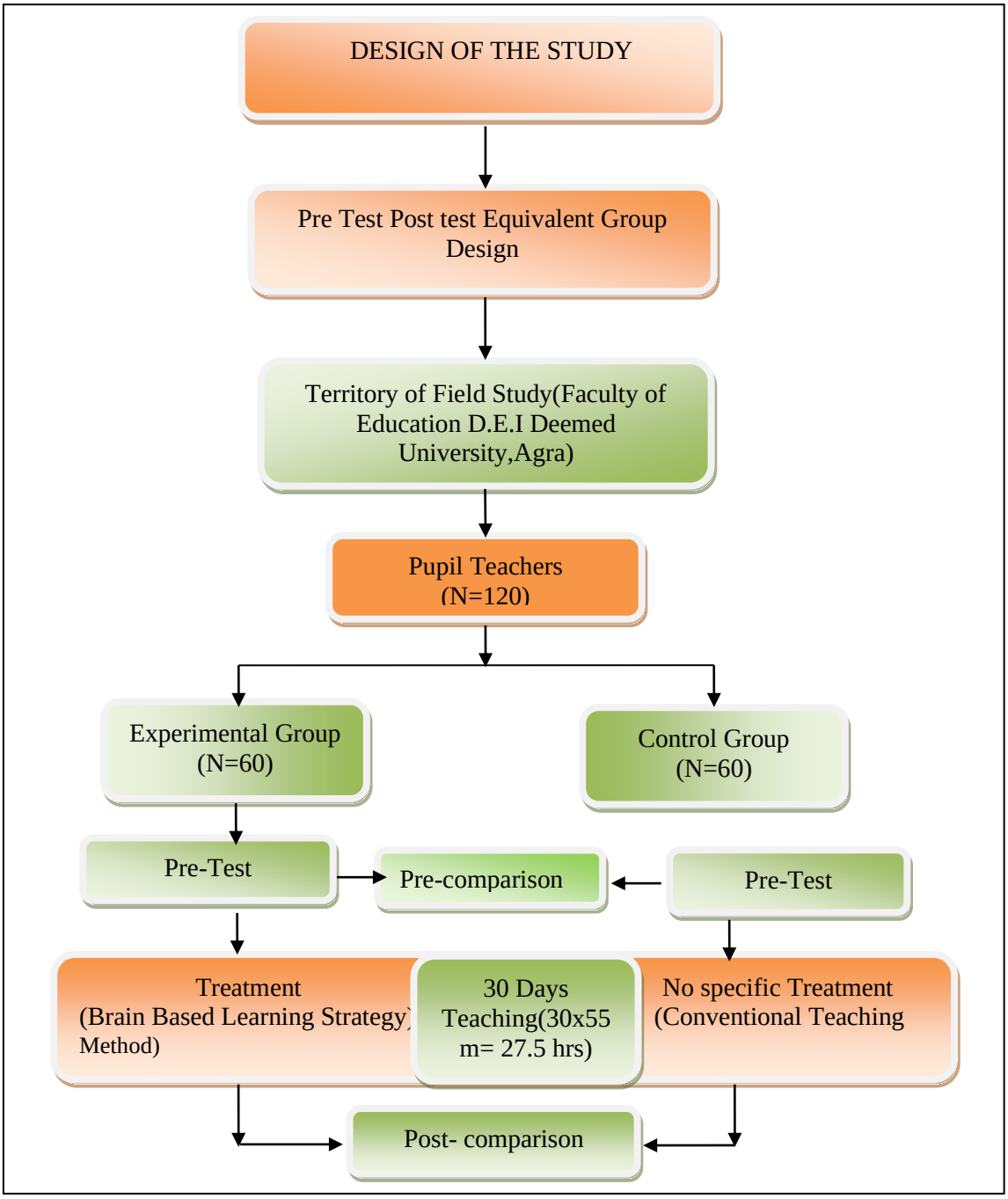

Figure 01: Showing design of the study

T able 1.1: Layout of the design is:

Groups	Pre-test	Operation/Treatment	Post-test
Experimental group	O_1	E	O_2
Control Group	O_3	C	O_4

Where, O_1 and O_3 - Pre tests ; O_2 and O_4 - Post tests. 'E' is the experimental group which was instructed through Brain-Based Learning Strategies and 'C' is the control group which was instructed through conventional method of teaching.

1.7.3 Sample Units:

In the present study, investigator will purposively select Faculty of Education, Dayalbagh Educational Institute (Deemed University), Agra for field study and total 160 students from different sections of faculty of education, Dayalbagh Educational Institute (Deemed University), Agra will be selected through simple random sampling method. Further, investigator will randomly assign a section of 80 students as experimental group and another section of 80 students as control group. Thus, 160 sample units will be selected for the present study. The design of sampling is shown on next page-:

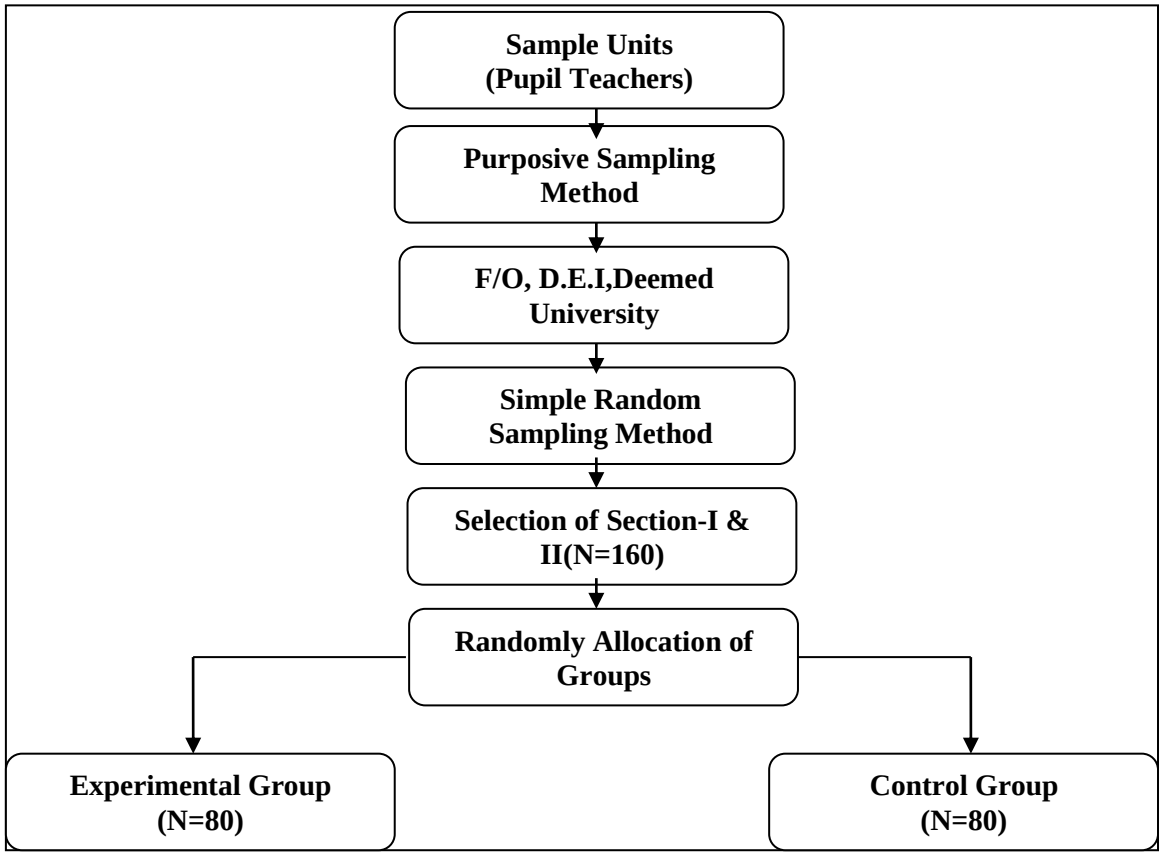

Figure 02: Showing Sample design

1.7.4 Variables of the study:

Independent variables: Brain based teaching learning method and traditional teaching learning method

Dependent variables: Pedagogical Culture, Cognitive Style and Self Efficacy

Control Variables: Course of study (B.Ed), Age, Institutional administration, Geographic conditions,

1.7.5 Tools of the study:

Brain Based Learning is the purposeful engagement of strategies based on principles derived from

solid scientific research. These strategies based on body/mind/brain research. The present study measure the effectiveness of Brain based Strategies on pedagogical culture, cognitive style and self efficacy of pupil teachers. So, the investigator will use the following tools for the present investigation:

1. Scale for Pedagogical Culture:

Pedagogical culture is an integrated characteristic of teacher's personality, which includes a certain level of mastery of professional-pedagogical values, person-oriented technologies and methods of creative self- realization in professional activity. Standardized scale for measuring the pedagogical culture of pupil teacher is not available. Thus, A likert five point rating scale will be constructed by investigator reflecting the various domain of pedagogical culture i.e. speech culture, mastery of pedagogical techniques, pedagogical skills, pedagogical improvisation, perceptual and suggestive abilities, pedagogical optimism, balance and demanding. Investigator will estimate the coefficient of Cronbach's alpha reliability and coefficient of test- retest reliability. The validity of scale i.e. content validity and construct validity will be determined by the investigator.

2. Scale for Cognitive Style:

Cognitive Style Inventory (CSI) developed by Praveen Kumar Jha (2010) will be used for measuring the cognitive style of pupil teachers. It is a self-report measure of the ways of thinking, judging, remembering, storing information, decision making and believing in interpersonal relationship. The Cognitive Styles Inventory (CSI) comprised 40 statements from which 20 statements are related to Systematic Style and the other 20 statements to Intuitive Style and are to be responded on five point scale running from 'Strongly Agree' to 'Strongly Disagree' with three middle responses of 'Agree', 'Undecided', and 'Disagree'.

It enables to assess the five styles, namely, systematic style, intuitive style, integrated style, undifferentiated style, and split style. Reliability of test was determined by two methods – (i) Split-half method (ii) Test-retest method. (i) The full length split-half reliability of CSI was found 0.653 (< .01). (ii) The test-retest reliability of the CSI is significant beyond 0.01 level of confidence. The validity of the test is examined in different ways. Here the validity was examined by three ways; i.e. content validity, concurrent validity and internal validity.

3. Scale for Self Efficacy:

Self-efficacy is mainly studied from two perspectives – a) General self efficacy, which focuses on individuals' overall belief in their ability to perform well in a variety of situations and b) task specific or situation specific self-efficacy, which refers to capability beliefs specific to a particular task or situation. In the present study, self efficacy of pupil teachers refers to capability beliefs specific to their teaching-learning task management. No scale will found in this context and investigator found primitive reviews on concepts related to self-efficacy (e.g. Bandura, 1986; Pajares, 1992), teachers' belief system (Errington, 2004), creativity, innovation (e.g. Kanter, 1988; West, 2002), innovative practices in teaching (Messmann, Mulder & Gruber, 2011) were done to build a preliminary idea about innovative self-efficacy. Drawing insight from literature review, Investigator will develop five point likert scale including five domains of self-efficacy will be hypothesized: i) designing new teaching strategies, ii) implementation of new ideas, iii) experimenting new things, iv) exploration of opportunities, and (v) bringing flexibility in teaching approach. Investigator will estimate the coefficient of Cronbach's alpha reliability and coefficient of test-retest reliability. The validity of scale i.e. content validity and construct validity will be determined by the investigator.

1.8.0 STATISTICAL TECHNIQUES:

Both Descriptive and inferential statistical techniques will be applied as per nature of data.

Table 1.2: Showing statistical techniques as per aim of the study

Purpose of Analysis	Statistical Techniques
• Significance deference between Pre and Post test scores of experimental group in the light of variables of the present study. • Significance deference between Pre and Post test scores of control group in the light of variables of the present study.	Mean Standard Deviation Correlated t-test ANCOVA

1.9.0 DELIMITATIONS OF THE STUDY:

The study will be delimited in the following manner;

1. The present study will be delimited with territory of field study i.e. Faculty of Education, Dayalbagh Educational Institute (Deemed University), Agra.
2. The present study will be delimited with the number of the responders (sample units). Only 160

B.Ed students (80 Pupil teachers under experimental group and 80 Pupil teachers under Control group) will be taken as sample in the present study.

1.10.0 SIGNIFICANCE OF THE STUDY

The study is significant to the field of education in that it builds upon the available body of knowledge about brain based learning. The present study will have significance for the following stakeholders. The teaching community seems to be obsessed by the idea that the applicability of innovative strategies has severe limitations. Though most of the developed countries have made such practices common, India has still not been able to develop these strategies. The success of present research will develop confidence among teachers for using these strategies. Training programmes can be conducted on brain based learning for in-service and pre service teachers. The teacher educator would be able to equip the next generation with certain Brain Based Learning strategies. The study has the implications to curriculum designers to include those strategies in the curriculum of pre-service teacher education programmes at various levels.

The changes are also expected in students. As a consequence of teaching them though these strategies they would enhance their thinking abilities. Thus the strategies developed in the study will help to provide good classroom practices for teachers so that they can create optimum learning environment in the classroom.

This research is based on the strong opinion that learning among student teachers as adult learners is best achieved when learning is made relevant, when their opinions, views and experiences are considered; and when learning is geared towards meeting their physical, intellectual, psychological, social and emotional needs; and they are treated with respect. It is the objective of current research to investigate whether brain based learning influences the Pedagogical Culture, Cognitive Style and Self Efficacy of pupil teachers. From the review of related literature, it is encapsulated that brain based learning influences the all round development of the students i.e. cognitive, affective and psychomotor. Thus, at pre-service teacher education programme, effectiveness of brain based learning in the light of Pedagogical Culture, Cognitive Style and Self Efficacy of pupil teachers is crucial and burning issue for present study. The outcomes of this study will be revamped the framework of teacher education programme.

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